Analysis plan for power outages and medicare hospitalizations 2018:

Exposure: daily power outage

Outcome: CVD and respiratory related hospitalizations (anything in first 5 ICD codes related to those)

Study design: conditional quasi-Poisson case-crossover situation

Exposure:

* Use 8+ hour daily binary county-level power outage exposure we just wrote the simulation paper about, with 0.5% cut point
* Repeat analysis 3 times with different cut points in number of customers out (0.5%, 2.5%, 5%?)
* Look at the distribution of customers out within 0.5% cut point and see what the distribution is of customers out within those outages; go as high as we have the power to go
* Repeat analysis using a continuous measure of power outage as well (number of hours without power per day)
* Can include terms for power outage exposure 2 days prior, previous day, and same day
* Seems like a 3-4 day lag is reasonable; more is probably unlikely? Could do sensitivity for up to five days/a week or something if we’re interested (we should research which lag we expect with temperature literature; look at sebastian’s temperature stuff)
* When we have the continuous exposure, might need to use dlnm
  + Can estimate acf by county for lag 0 and 2 and lag 0 and 1
  + Can look at distribution of those values
  + If they are not autocorrelated more than 0.4 or 0.5, then probably do not have to worry about autocorrelation
  + Same with continuous measure.
  + Can model continuous power outage exposure with either penalized spline or natural spline, depending on if the model takes a long time to run.
  + If it’s not slow, can do penalized spline, and that will answer the question of if power outage has a threshold effect/whether or not its linear
  + If not we can compare the linear model with a natural spline model using the qAIC and see if the nonlinear option better explains the variation to answer if the relationship is non linear

Outcome:

* Start with cardiorespiratory – mechanisms are different btw cardiorespiratory and injury
* Transition btw 1CD-9 and ICD-10 happened in 2015.
  + J00-J99 codes are respiratory;
  + I codes are circulatory – need to look at the subset that are cardiac (can ask chatgpt (need to do a little research)
  + Effect measure modification by DME estimates (quartiles of DME prevalence)
* We’re including cardiorespiratory bc we think through heat and loss of DME these are most likely
* Could include injury but want to see if we can distinguish between hip replacement and other injury ones – ask vivian about this.

Confounders:

* We think weather-related confounders are probably the most relevant
* Temperature the biggest confounder
  + Also snow storms, precipitation, hurricanes, flooding, tornadoes
* Planning to include temperature, precipitation, and wind in main model
  + gridMET – daily weather conditions, PRISM + NLDAS 2

Match on month, hopefully we don’t lose too much power from not having any contrast within strata because the exposure is so rare. Can check this and maybe increase the period to two months. Need to check how seasonal power outage is (plot the number of events per month), and then maybe we can increase stratum size.

Should also restrict to counties that have outages – no point in including counties that have 0 or 1 outages. (some restriction on exposure in the county).